RCA

VALUE ANALYSIS

EVALUATING THE WORTH OF A PRODUCT'S FUNCTION

S.A.V.E. SYMPOSIUM, IN HONOR OF LAWRENCE D. MILES
WESTERN ELECTRONIC CONFERENCE, LOS ANGELES
AUGUST 23, 1966

CORPORATE STAFF MATERIALS
RADIO CORPORATION OF AMERICA
CAMDEN, NEW JERSEY

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Carlos Fallon, Manager Value Analysis

RCA Corporate Staff, Camden, N. J.

"When I define Beauty as a promise of Function; Action as the presence of function; Character as the record of Function, I arbitrarily divide that which is essentially one."

Horatio Greenough, FORM AND FUNCTION

"Possibly the greatest and most original contribution made by Miles in his development of value engineering is the concept of functional approach."

Edward D. Heller, JOURNAL OF VALUE ENGINEERING 3:2

"The function or group of functions now have, not only the traditional performance specification, but also a new function/cost measurement which is in effect an economic specification."

Lawrence D. Miles, PROCEEDINGS OF THE 1966 NATIONAL CONVENTION, Society of American Value Engineers.

And this economic specification is the key to measuring value!

Accepting John Stuart Mill's solution of the paradox of value, most economists agree on the two essentials of exchange value: "the thing must conduce to some purpose, satisfy some desire" (our function), and "there must be some difficulty in its attainment" (our cost).[1]

But the first of the two essentials, the one which would "conduce to some purpose, satisfy some desire," has been considered beyond the scope of measurement--unanalyzable!

"The analysis of the 'unanalyzable' and the conception of the 'inconceivable' have in the past constituted some of the most important spurts in the progress of science," Russell Ackoff has said in his extraordinarily useful book, Scientific Method.[2]

We owe such an advance to Larry Miles. He not only tackled the unanalyzable, but he showed us how to analyze it; how to identify, classify, and evaluate the function;

how to pinpoint its most important aspect in a verb and a noun; how to select measurable nouns; and how to combine physical measurements and business measurements to yield an economic specification.[3]

CONFORMITY OR DIVERSITY

Under Larry's leadership and with his unfailing support a variety of methods have been developed to attain this end.

Roy Fountain's value standards mathematically relate the dynamics of a physical effect to the expenditure of resources in producing such an effect--you find out just where the dollars are going and why.[4]

In a lucid journal article[5] Ed Heller describes his own method and a method developed by Fred Sherwin for relating the two essentials of economic value, worth of the function, and cost of providing the function.

DOGMA OR DISCUSSION

There is some disagreement among value specialist on the choice of words to describe what we do. In summarizing an interchange among panel members at our recent convention, I said, "Roy Fountain disagrees with my use of the term worth, but I forgive him."

A sad voice from the audience tremulously asked, "Then the panel is not in agreement?"

Of course not. Under the leadership of Ervin Leshner and the planned needling of Professor Norman N. Barish we were diligently searching for areas of difference. Hard as we tried, however, we could not disagree on what we did as value specialists. We only disagreed on how we talked about it--on the use of the language.

THE FUNCTION

Levels of Abstraction

Now, what is the function of language? Communicate ideas will do for a start, but following Ed Heller's advice,[5] we go to a higher level of abstraction: Create understanding.

Starting at the lower level, most of us in value work try to communicate our ideas precisely, but if we bear the higher level function in mind--create understanding--we will not let linguistic precision create friction instead of understanding. My remarks on Evaluating the Worth of a Function, therefore, will be phrased in words offered for criticism and improvement rather than adoption.

Worth, Cost, and Value of Definitions

Beardsley, in his Practical Logic[6] gives two functions of definition: supply meaning and restrict meaning. At a lower level of abstraction, Schiller[7] had stated that a definition must serve a given purpose by making it convenient or possible for the term defined to state the essence of what is important at the time. We can describe Schiller's function of definition as: state essence. The functions given by Beardsley and Schiller provide us with upper and lower bounds--an essential step in establishing worth. Setting bounds establishes a range of choice or working area between what is less than acceptable and what is more than required. Anything within this range of choice is worthwhile. But worth is not the whole story, it must be related to cost to arrive at value.

Is it possible that before defining our terms we are already getting into the Worth of the Function? Frankly, yes. To paraphrase Einstein's remarks about scientists,[8] "If you want to know what a value specialist does, don't ask him, they are awful at talking about it, just watch him do it." Being more awful than most, I have chosen to do value analysis as I write this paper in the hope that actually evaluating the function will tell the story if talking does not.

The cost of a definition is cost in reader's time. For a given writer, at his average level of lucidity, cost in reader's time can be measured in the number of words used to convey a given point. (For a warning on numerical measures of writing style, I recommend Lufkin's delightful article on page 19 of Reference 3).

Measuring Relative Worth. To measure the relative worth of our definitions, we can plot worth along the Y-axis of the graph, starting at the bottom with the bare statement of essence, to which we assign the number 70 (anything below 70 flunks), and working up to the perfect definition, to which we assign the number 100. We then lay out the number of words along the X-axis, ending at 60, the greatest cost we are allowed to incur for any one definition in this paper.

A few trials will reveal that words used in a definition follow a pattern of diminishing returns. The first few words convey most of the meaning, then the contribution of each additional word decreases in some relation to the number of words already used.

Let's regard the definition as a product we are about to manufacture. We have already established the upper and lower bounds of the function, and we have assigned numbers to identify any place between these upper and lower bounds where our proposed products may fall. If the definition barely states essence but also supplies meaning and restricts meaning beyond that implied in the statement of essence, its rating will go up in proportion to how effectively it contributes to meaning until it has completely supplied meaning, and completely restricted meaning, thus becoming a Rolls-Royce among definitions and rating 100 for perfect attainment of the function.

The Importance of Cost. Our customer, however, may not want a Rolls-Royce. We are not defining for all mankind in the outside world where it rains and a cozy car would be handy; we are defining for fellow value specialists, indoors-- a scooter might do very well. Besides, can our customers afford a Rolls-Royce? Can value specialists at a convention afford to wade through sixty-word definitions? Can they spend time digesting something of the order of the Nicene Creed?

Our marketing department (the editors who review this paper) say No. "Value Specialists," they point out, "are professionals, not school children. Give them the essentials and let them use some of their brain power. Supply and restrict only the meaning that you need for this paper."

Sounds like low cost definitions. Let us see how cost, in number of words used, affects the value of definitions, assuming a good choice of words and a uniform level of skill.

Definitions of Measurement

1. Classification by numerical values (Bross[9] p. 155).

2. The assignment of numerals to aspects of objects or events according to rule (Stevens[10] p. 24).

3. A way of obtaining symbols to represent the properties of objects, events, or states, which symbols have the same relevant relationship to each other as do the things which are represented (Ackoff[2] p. 179).

These definitions, when taken in context, fully satisfy the needs of both writer and reader. If some do not rate too high for our purposes, it is because we have taken them out of context. Why pluck them out at all? Because we need a basic, elementary definition to begin with.

Basic Cost of Providing the Function. Now, following classical value analysis, we determine the basic cost of the function - the very minimum rock-bottom cost for which the function of defining measurement can be performed. That is why we took the Bross definition by itself, even though it is supported by a whole chapter on measurement. Bross does define measurement in four words, and that is what we are looking for.

Worth of the Function. The Bross definition states essence - the lower bound of the function, so we rate its worth as only fair. The cost, of course, is ideal.

Most value analysts call this basic cost of providing the function, "the value of the function." In my own work I find it more profitable to follow established economic usage, discriminating between cost and value where the concepts are clearly distinct.

Building up from Basic Cost. By adding four more words to make the basic definition read, 1A. "Classification of properties by numerical values for comparison," we state the function of measurement, thus improving the definition's worth from "fair" to "good", which gives us a good definition in 8 words.

But is it worth doubling the cost to improve it? And what do we mean by "good?"

For many years school teachers in the United States have been measuring accomplishments in reading, writing, arithmetic, physical training, attendance, etc., using a scale ranging from 70 (passing) to 100 (perfect). We can use such a scale to define what we mean by "good" and to help us measure the worth of our definitions. Here it is:

100 = Perfect

95 = Excellent	80 = Fair
90 = Very Good	75 = Adequate
85 = Good	70 = Marginal

The second definition supplies meaning beyond the bare statement of essence. This is a good definition for us and the cost, 13 words, is not high. Eliminating one word and adding two new ones would make it very good. It would then read, "Assignment of numerals to aspects or properties of objects, events, or states according to rule," to give us a very good definition at a cost of 15 words.

The third definition states essence, supplies meaning, and restricts meaning. It is excellent for our purpose, and it costs only 31 words. Ackoff bases it on this reasoning: "We can define measurement as a process whose output can be used in a particular way. This makes the essential property of measurement the functional property of its product, rather than the way it is produced . . . . Therefore, in general terms, measurement can be defined in terms of its function" (underscoring is mine).

To make that definition perfect for this paper, we can combine it with the paragraph above, as follows:

Measurement: A process whose output can be used in a particular way for obtaining symbols to represent the properties of objects, events, or states so that the symbols have the same relevant relationship to each other as do the things they represent. The essential property of measurement is the functional property of its product, rather than the way it is produced.

Using the Assigned Numerals. We will designate this 60-word definition 3A, and for the sake of illustration, we will call it "perfect" and assign to it the numerical rating of 100. Here is a tabulation of our appraisal:

WORTH AND COST OF SET OF DEFINITIONS

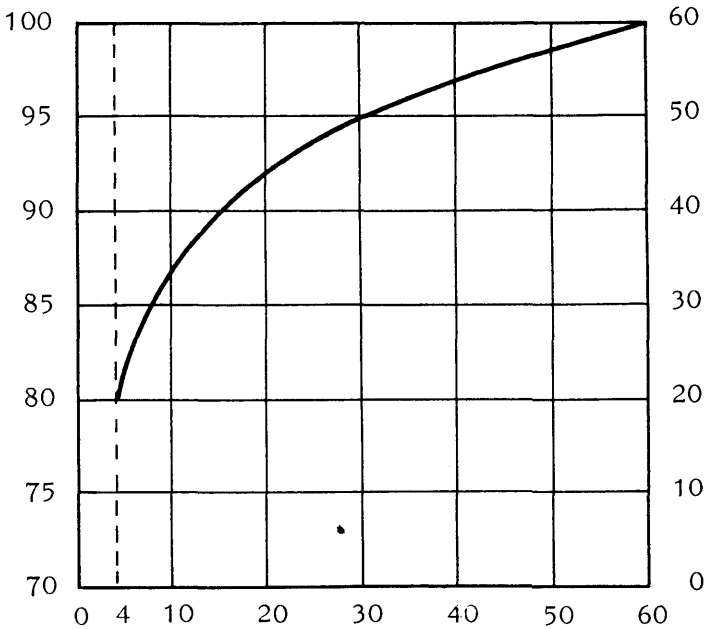
Definition	Verbal Rating of Worth	Interval Scale of Worth	Ratio Scale of Worth	Ratio Scale of Cost	Ratio of Worth to Cost	Index of Value	Measure of Gain
1. Classification by numerical values.	Fair	80	20	4 words	20/4	5	16
1A. Classification of properties by numerical values for comparison.	Good	85	30	8 words	30/8	3.75	22
2. The assignment of numerals to aspects of objects or events according to rule.	Almost V. G.	89	38	13 words	38/13	2.95	25
2A. Assignment of numerals to aspects or properties of objects, events, or states according to rule.	Very Good	90	40	15 words	40/15	2.67	25
3. A way of obtaining symbols to represent the properties of objects, events, or states, which symbols have the same relevant relationship to each other as do the things which are represented.	Excellent	95	50	31 words	50/31	1.61	19
3A. A process whose output can be used in a particular way for obtaining symbols to represent the properties of objects, events, or states so that the symbols have the same relevant relationship to each other as do the things they represent. The essential property of measurement is the functional property of its product, rather than the way it is produced.	Perfect	100	60	60 words	60/60	1	0

Significance of the Numbers. More than 2000 years before Lord Kelvin made his well-known remark on the importance of numbers, Plato wrote, "If from any craft you subtract the elements of numbering, measuring, and weighing, the remainder will be almost negligible . . . what you would have left would be guesswork . . . rule of thumb . . . lucky shots . . ." (The Philebus).

Worth Related to Cost: A Curve of Value. From the numbers in our chart we can plot three useful curves. The first one relates the worth of a function to the cost of providing that function. We know that there is a relationship between the two, and that in the particular product we are analyzing, worth increases with cost at a declining rate. A curve, graphically relating worth to cost shows the nature of the relationship and the rate of decline. If such a curve is developed from representative examples of a product line, it can serve as an aid in setting attainable goals for new products as well as for improving existing products.

To plot the curve we simply make a mark at the point where the worth of each definition coincides with the cost of that definition. Then we draw the fair curve joining all the points, as shown on the chart below:

WORTH RELATED TO COST



Cost in Number of Words Used

Note: The interval scale on the left has a corresponding ratio scale on the right for use in deriving the curve of value related to cost.

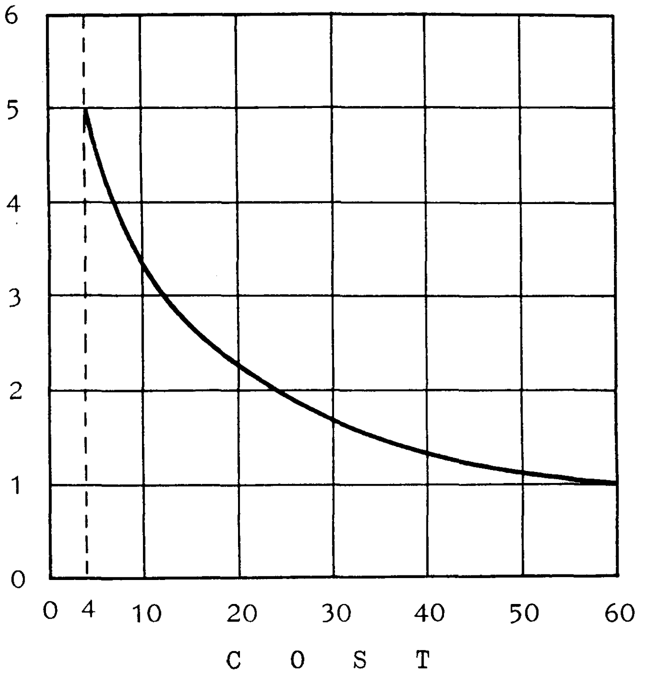
There happens to be a mathematical formula that will generate this particular curve (see the Appendix, if you are interested).

Value Related to Cost: Expected Return. Comparable to return on investment in accounting, the index of value for each product or proposed product can be plotted to yield a curve relating value to cost (a curve of expected return), but the vertical scale must be in units of the index of value.

It should be remembered that an index has no dimension of its own; its magnitude simply serves to indicate the relative magnitude of two other quantities with respect to each other.

The graph relating value to cost, therefore, only shows that the ratio of worth to cost declines as cost increases for this particular product. In this case the curve reveals that the "perfect" definition, because it is the most costly, barely achieves

VALUE RELATED TO COST



a fair value. This brings home to us the high cost of perfection, which does apply to many another product.

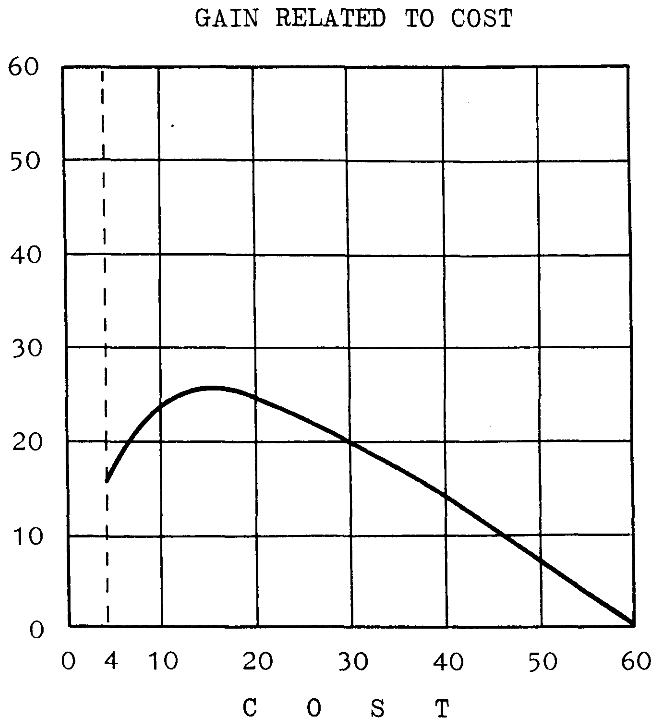
Developed from the value indices of known or proposed products, such a curve as this can provide indices of expected value for similar products governed by the same criteria.

Gain Related to Cost: Profit. If instead of dividing worth by cost to obtain the points which generated the above curve, we subtract cost from worth to measure the gain in each case, we obtain a curve based on the gain of known or proposed products, a curve which can also provide a measure of expected gain for similar products governed by the same criteria. Gain in this sense is a simpler version of profit. It is the cost accountant's measure of earnings directly attributable to the particular product being analyzed. To plot this curve we must transform the units of the 70 to 100 interval scale into units directly commensurable with those of the horizontal axis. This is not too much to ask because the upper and lower limits of cost, in the horizontal scale, where set to coincide with the upper and lower bounds of worth, and the number of subdivisions in both scales was designed to be the same. The only change required to arrive at the new vertical scale is a change in the numerical designation of the subdivisions so that they can measure the actual geometry of the graph. An example of the gain curve appears on the following page.

It would take an advanced value seminar to go into what can be learned from these curves, specially on the advantage of investing enough resources to do the job right in the first place, and on the rich rewards for value analysis that can be reaped by improving performance.

Tricky Scales and How to Harness Them

The vertical axis, on the first of the three charts, constitutes a scale of worth ranging from marginal to perfect, and quantified numerically in school-type grades uniformly spaced over an interval ranging from 70 to 100, where 70 corresponds to marginal and 100 to perfect.



The intervening numerals correspond to the intervening qualitative shadings and preserve the relative length of the intervals among the verbal ratings, but they do not, of themselves, reveal the ratios among these intervals. The ratio of Perfect (100) to Fair (80) is as 3 to 1, as can be seen in the chart, and not as 5 to 4, as implied by the 100 to 80 designation.

Interval and Ratio Scales. In ratio scales, such as 12 inches, 60 minutes, or 100 cents, ratios as well as intervals remain invariant through a linear transformation. If we match the end points: 0 to 12, 0 to 60, 0 to 100, we find that 3 inches, 15 minutes and 25 cents coincide because each is one quarter of the whole. We also know that 6 inches, 30 minutes, and 50 cents are not only half the length of the interval, but that the numbers 6, 30, and 50 are also half of 12, 60, and 100 respectively.

An interval scale, such as our school-grade scale or the thermometer scale does not preserve ratios. 90°F is not twice as hot as 45°F and although 104° fever is about twice as much fever as 101°, the number 104 is not twice the number 101.

Why then must we use an interval scale, instead of the more useful ratio scale for our initial quantification of worth?

For the same reason that the Fahrenheit and Celsius (centigrade) scales turned out to be only interval scales. The arbitrary zero points chosen were not real zeros, as is the zero point in Lord Kelvin's more recent temperature scale.

In matters of human desires, we must face the fact that we do not know how far down the zero point corresponding to "utterly stinko" really is. For this reason teachers seldom grade school papers zero. The numbers chosen for our interval scale tell us in themselves that they do not represent ratios.

Once we have established finite end-points, such as 70 to 100 for our known interval, we can transform the subdivisions of that interval into a ratio scale such as 0 to 60 or 0 to 6. Other scales of interest are:

Nominal and Ordinal Scales. The nominal scale simply names units, events, or states by number, as in car license plates, football players, or policemens badges, the only rule being "one to a customer." The ordinal scale on the other hand, tells us which comes before the other, as house numbers do. House numbers describe the sequence in which houses are ordered along the street, but they do not tell us how wide each house is with respect to the others.

Exponential Scales are useful when the relationship among the units, properties or events being measured is multiplicative rather than additive, as in measuring the sensation of pain against the stimulus of heat generated by the dentist's drill, or the sensation of brightness against the stimulus from a source of light. Such scales may well lead to error unless we know that the power relationship in fact holds good throughout the whole range of measurement.

A special case of the exponential scale is the logarithmic scale. This scale is useful when it is desired that intervals on the scale decline in length as the magnitude of the numbers increases.

EVALUATION: USING MEASUREMENTS, SCALES FOR COMPARISON, AND DEFINED TERMS

Having taken the reader on an excursion through the fields of measurement and the jungle of diverse scales, it is time we tried our hand at the necessary definitions for evaluating the worth of a product's function.

Some Tentative Definitions

Want (verb): To desire earnestly, need or require.

Wants (noun): Earnest desires, needs or requirements

Customer: One who offers money or other desirable considerations in exchange for the satisfaction of wants. (In this paper--thanks to George E. Fouch's suggestion, we are using the term to designate a composite buying market,[11])

Product: Whatever a supplier does or produces in exchange for money or other desirable considerations. The word is used here for both a product and service.

Worth: The customer's appraisal of the combination of desirable characteristics that make him want the product.

Product Worth: A measure of the ultimate user's regard for the capability of the product to satisfy his wants.

Cost: A monetary appraisal of the time effort and risk of buying, plus everything else the customer has to pay in order to acquire, use, enjoy, maintain, and dispose of the product.

Initial Cost: The cost of the time, effort, and risk of buying plus the price of the product.

Product Cost: For purposes of this paper, total cost to the customer, as defined under cost, of a product which is the subject of value analysis.

Product Value: The relationship of product worth to product cost.

Index of Value: The relationship of worth to cost expressed as a numerical ratio reduced to a figure of merit. An index, of course, is a dimensionless number.

For example, a customer appraises a product:

CALCULATING THAT	HE CALLS IT	IND
The function is worth $20 and the product costs $10.	A good value	2.0
The function is worth $10 and the product costs $10.	A fair value	1.0
The function is worth $ 5 and the product costs $10.	A poor value	0.5

The index of value is analogous to return on investment in business and to efficiency in mechanics, both ratios of input over output.

Measure of Gain: The excess of worth over cost expressed in a common dimension. The measure of gain is analogous to profit in business.

For example, a customer appraises his purchase of a product:

CALCULATING THAT	HE CALLS IT
The function is worth $20 and the product costs $10.	A $10 gain
The function is worth $10 and the product costs $10.	An even exchange
The function is worth $ 5 and the product costs $10.	A $5 loss

When we say we want to give the customer more than his money's worth, we are talking about the dollar-gain he experiences when he buys a product from us. This is where the sweat must flow in the arena of the market place!

Cost to Us: Used here to designate all manufacturing and acquisition costs, but not R&D, marketing, service under guarantee, G&A and profit.

Buying Considerations

I have yet to meet an audience where a single member will admit to buying on price alone. The major considerations in buying are performance (including quality, reliability, and all the other "itties,") delivery, service, price, and confidence, though not necessarily in that order. We can find out from Marketing how our company's customers rate these considerations, because rate them they do--through their buying habits!

Anything the value program can do to improve product performance, delivery, service, price, and confidence in the company, contributes to product value.

IMPROVING THE WORTH OF THE FUNCTION

One way to improve the worth of the function is to improve the worth of how the function is performed. For example, the function of a grenade launcher is to hurl grenades. The customer pays a portion of the sale price for the capability of hurling grenades a given distance, in a given direction at a given rate, measured in terms of range, accuracy, and rate of fire. The rest of the sale price goes into how he wants them hurled – how often, under what climatic conditions, and how reliably.

To perform its function, the grenade launcher must not only be capable of hurling grenades; it must be dependable to a known degree; and it must be there, that is, it must be available, ready for use, when and where it is wanted.

Performance of the function is thus broken down into AVAILABILITY, CAPABILITY, and DEPENDABILITY. These characteristics are usually specified, by the customer, in measurable requirements, for example:

Availability

Delivery schedule, in months.

Field Mobility, the converse of size and weight measured downward from given upper limits in pounds, and in linear inches of limiting dimensions.

Logistics, in tons per day required to deploy, supply, and maintain a given number of units. The converse is Logistical Advantage in tons per day below a given upper limit.

Capability

Range, in yards.

Accuracy, the converse of the major axis of the dispersion pattern, in feet.

Rate of Fire, in rounds per minute.

Dependability

Reliability, the converse of the number of rounds to failure, or number of rounds between failure.

Ease of Operation, the converse of the number of operators multiplied by the required training time.

Ease of Repair, two numbers: (1) the converse of the mean time to repair multiplied by a given number of rounds fired, and (2) the same unit of time multiplied by a given number of field miles traveled.

Ease of Maintenance, the converse of the time required to maintain the equipment in a given period of combat use.

Ruggedness, three sets of numbers: (1) the usual shock and vibration units, such as g's, frequency and excursion, etc. (2) the usual temperature limits in degrees F, (3) indices of endurance in jungle, desert, or arctic environments.

The last requirement, endurance in arctic environments, for example, has very little value to the patrol boats of North Vietnam's navy yet they have to pay the penalty in weight, size, and cost of Chinese storage batteries designed for the nearly arctic climate of Manchuria. The larger country, in suppling its smaller allies, must take into consideration, not only what they need, but also what they do not need.

Prime responsibility for determining needs rests primarily with the customer. Certain product characteristics and buying considerations are more important to him than others.

In business we depend upon Marketing to elicit information on customer needs. The Marketing people can provide us with weighting factors which suggest the relative importance of product characteristics and buying considerations as the customer sees them.

Having converted the sale price into cost-to-us figures, we use Marketing's weighting factors to find out how much we can spend on each function or contributing benefit. The resulting figures are then compared with the cost of providing the same function, in other industries, to make sure that we provide the required function at least cost.

TOWARD CREATING UNDERSTANDING

Ten years ago, when a value task group came up with 60% savings and a better product, it did not matter what we called cost and what we called value. Management gave us more high-cost or high-volume items to look at, and we responded in terms of money.

Today we are not only looking at high cost or high volume items; we are looking at tomorrow's product line, as well as the present one. Product planning, Marketing, and financial people are participating in value analysis studies. When we subcontract design work, we frequently have to value analyze future products for which we are the customers.

It becomes increasingly important, therefore, to use words readily understood by our customers, subcontractors, suppliers, accountants, product planners, and above all by our own top management.

To arrive at the economic specification of a function, cited at the beginning of this paper, value specialist have served as catalysts, providing more meaningful communication, and faster interaction among business and engineering disciplines.

To pursue the decisive advantages of timely and meaningful communication, the value specialist must practice the art of plain talk, choosing standard words instead of specials, defining his terms in line with accepted usage among the people with whom he wants to communicate, and using only those mathematical tools which are readily understood by the decision-maker who incurs the risk of change.

This writer hopes that the approach taken in this paper to measurement, to the use of standard scales, and to understandable and useful definitions, will stimulate other workers in the field to improve upon this paper by generating simpler and more straightforward, yet adequately meaningful tools of communication. After all, we have a model that is hard to beat, when we remember Larry Miles saying,

"What does it do? Say it in a verb and a noun!"

"What does it cost?"

"What should it cost?"

"Put a dollar sign on the rock-bottom cost of the basic function."

"What else will do the job? Search, combine, change, create!"

APPENDIX

Assuming that the cost (in reader's time) of understanding a definition is equivalent to the number of words in the definition, and further assuming that the contribution made by adding words to an elementary definition declines in proportion to the number of words already used, we at once think of a logarithmic function, similar to Bernoulli's function for marginal utility in the acquisition of money. Although much can be said for Bernoullian Utility, it does not describe too well the declining worth of money to the man who wants more money.

The money seeker may not be seeking money to satisfy ordinary wants. He may be a collector. He may not really like money, but he may like the fun of getting it.

When we postulate, on the other hand, a unit whose worth really declines in proportion to the sum of the units already used, a logarithmic function may well fit the curve. So we try $y = k \log x$ where k is a constant multiplier to make y increase at the rate that our measure of worth increases on the 0 to 60 metric scale. (This is the scale into which we transformed the 70 to 100 judgement scale).

To find k we set $y = 60$ which should correspond to $k \log 60$, and we solve for k. If $y = k \log 60$, then $k = y/\log 60$, but $y = 60$ so $k = 60/\log 60 = 60/1.77815 = 33.75$.

The formulae for the three curves, within the interval a to b ($a = 0$, $b = 60$), open at the "a" end, and subject to the assumptions stated earlier, are:

Worth vs. Cost	$y = k \log x$
Value vs. Cost	$y = k (\log x)/x$
Gain vs. Cost	$y = k (\log x) - x$

Where $k = 33.75$, a constant multiplier.

It looks like our assumption of declining value, intuitively sound to begin with, panned out mathematically--or did it? Did the math tell us what the curve was? Certainly not. We knew where most of the points were. Mathematics only helped us draw the picture, and we trusted it to come up with an infinity of unknown points, which hopefully it did. But how do we convert this trust, this hope into something nearer certainty? We do so by testing a number of the points that we did not provide, by picking random points on the curve and asking about each point, "Is it possible, in the number of words shown below, to provide a definition worth what is shown on the left? And also by trying new definitions against the curve.

Testing the Validity of the Information

In working with a product line and the corresponding curve of existing products, the products of competitors and hypothetical new products should be used to test the derived curves as well as the initial Worth vs. Cost curve.

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11. George E. Fouch, Deputy assistant Secretary of Defense, Equipment Maintenance and Readiness, has helped this writer and his fellow workers with many a thought provoking suggestion on better ways to give our customers the most for their money.